Remarks/Arguments:

Please change the attorney docket number for this matter to "34261-2900".

Claims 1-26 remain in this application. No claims have been cancelled or withdrawn. Claim 1 was amended herein. Claims 27-29 were added.

The amendment to claim 1 corrects a typographic error introduced in a prior amendment by replacing "contractable" with "controllable" as found in Claim 1 as filed. Added Claims 27-29 are well supported by the application as filed. No new matter was added.

Claims 1-26 were rejected under 35 USC 103 as being unpatentable over Rutledge et al. (EP 0866581A1, hereinafter "Rutledge") and Mazurenko et al. (Spectral coding for secure optical communications using refractive index dispersion, Optical Communications 133 (1997) 87-92, hereinafter "Mazurenko"). Applicant respectively traverses because the cited references do not, individually or in combination, teach, suggest, or motivate all the recitations of the rejected claims, and because there is no teaching, suggestion, or motivation to combine the references in a manner that would satisfy the recitations of the rejected claims.

Failure of Rutledge To Teach, Suggest, Or Motivate "Refractive Index"

The Office Action admits that Rutledge does not anticipate the rejected claims in that it does not explicitly refer to "refractive index" or "integrated optics chip". In regard to the deficiency of Rutledge to teach, suggest, or motivate a "refractive index", the Office Action asserts that (a) Mazurenko teaches the use of refractive index for implementing a coding key, and (b) that it would have been obvious to modify Rutledge to have such a refractive index for implementing a coding key. As best understood, the Office Action is proposing that the phase modulator 204 and/or the OOK modulator 208 of Rutledge can be replaced with a modulator that manipulates refractive index (hereinafter an "RI Modulator"). If another combination was contemplated, Applicant requests that future Office Actions provide greater detail on the combination contemplated.

It should be noted that refractive index manipulation is not necessary to demodulate an ASK/OOK modulated signal. As such, there is no purpose in modifying the refractive index of the paths leading to demodulators 304 and 308 of Rutledge.

As will be discussed in greater detail in following sections, replacing one or both of the modulators of Rutledge is insufficient to satisfy the recitations of any of the rejected claims, at least as amended herein. If the cited references fail, both individually or in combination, to teach, suggest, or motivate all the recitations of the rejected claims, the cited references do not render the rejected claims obvious. (MPEP §2143.03.) Moreover, replacing both modulators with an RI Modulator would render Rutledge unsatisfactory for its intended purpose, and would also change the method of operation of Rutledge. In either instance, the combination of the references does not support an obviousness rejection. (MPEP §2143.)

Rutledge is directed to methods and apparatus for transmitting both an encrypted message, and a key used to encrypt the message. Rutledge accomplishes this by utilizing two different modulation techniques to form a signal, transmitting the signal, and then splitting the signal and using two different demodulation techniques to recover the encrypted text and the key so that the key can subsequently be used to decrypt the text. Utilizing the same modulation technique for both the message modulation and key modulation changes the method of operation of Rutledge. Moreover, doing so without additional modifications makes it impossible to recover both the key and encrypted message and thus renders Rutledge unsuitable for its intended purpose.

It should also be noted that the method of coding discussed in Mazurenko involves the use of refractive index dispersion (not dynamic refractive index manipulation), and the use of dispersive plates. As such, although the refractive index varies in regard to wavelength, it is static in regard to signal and key content. Modifying Mazurenko (or Rutledge) to modify an index of refraction over time is not taught, suggested, or motivated by the cited references. Moreover, such a modification of Mazurenko would change the method of operation of Mazurenko, and would also render it unsuitable for its intended purpose, i.e. providing a "secret" coding key that is not detectable by signal monitoring.

Failure Of Rutledge To Teach, Suggest, Or Motivate "Integrated Optics Chip"

As previously noted, the Office Action admits that Rutledge does not anticipate the rejected claims in that it does not explicitly refer to "refractive index" or "integrated optics chip". In regard to the deficiency of Rutledge to teach, suggest, or motivate an "integrated optics chip", the Office Action asserts that such an integrated chip is taught by Mazurenko, and cites a portion of the conclusion of Mazurenko that recites "integrated encoding/decoding dispersive systems". However, the use of the term "integrated" is used therein to mean that both the encoding and decoding systems utilize a common dispersion function for encoding and decoding. It does not teach an "integrated chip" as claimed wherein the recited elements are all part of the same chip. Moreover, Mazurenko is proposing a method for providing secure optical communications, and providing both the encoding and decoding systems on a common chip would only "secure" communications between two points on the chip. As such, the Office Action seems to be asserting an interpretation of integrated optics chip that is inconsistent with the meaning that is made clear in the application as filed, and that is inconsistent with how one of average skill in the art would interpret the term. If the interpretation apparently asserted by the Office Action is adopted and applied to Mazurenko, Mazurenko is rendered unsuitable for its intended purpose, i.e. the use of refractive index dispersion as a secret key in secure communications.

Failure Of Rutledge And/Or Mazurenko To Teach, Suggest, Or Motivate All The Recitations Of Any Rejected Claim.

Even if the combination proposed by the Office Action would not change the method of operation of the references or render them unsuitable for their intended purposes, the proposed combination does not satisfy all the recitations of the rejected claims. As such, the rejected claims are patentable over the cited references. Some, but not all, of the inadequacies of the references in regard to at least some of the claims will now be addressed. However, any dependent claims not explicitly addressed herein, as well as any dependent claim explicitly addressed, are patentable at least because of their dependence on one or more allowable claims as well as for any additional recitations they include.

Claim 1 as amended herein recites in part: "the encrypted message comprising light split from the coherent light source that passed through the first optical path combined with light split from

the coherent light source that passed through the second optical path." The cited references do not, taken individually or in combination, teach, suggest, or motivate forming an encrypted message by splitting light from a coherent source between two optical paths and combining the light that manages to pass through the paths. To the extent that Rutledge shows divergent paths, it doesn't do so to form an encrypted message, and doesn't teach, suggest, or motivate combining light that manages to pass through the paths. Moreover, Mazurenko does not overcome the inadequacies of Rutledge.

Claim 2 recites in part: "where the wave guide produces "exclusive or" functionality based on the message signal input and the key signal input." The cited references do not, taken individually or in combination, teach, suggest, or motivate XOR functionality based on message signal input and key signal input. In Rutledge, the second modulation step of on/off keying does not provide XOR functionally. When "off" the resultant signal is false/off regardless of the message signal that enters the OOK modulator 208. When "on" the resultant signal takes the value of the message signal that enters the OOK modulator regardless of whether it is currently true or false. This is not an XOR function which would yield true if exactly one but not both of two conditions was true. Combining Mazurenko with Rutledge does not overcome the inadequacies of Rutledge.

Claim 5 recites: "An integrated optics encryption device comprising: a multi-functional integrated optics chip having an input, an output, a message signal input, and a key signal input, and a coherent light source connected to the input of the integrated optics chip." As previously discussed, the cited references do not, taken individually or in combination, teach, suggest, or motivate a multi-functional integrated optics chip having the specified inputs coupled to a coherent light source.

Claim 6 recites in part: "multi-functional integrated optics chip comprises at least two divergent paths, each path comprising an end." The cited references do not, taken individually or in combination, teach, suggest, or motivate a integrated optics chip comprising two divergent paths as well as the inputs of Claim 5. The Office Action asserts that the receiver 300 of Rutledge, comprises divergent paths. However, as the Office Action admits, Rutledge does not teach, suggest, or motivate an integrated optics chip, and there is no teaching, suggestion, or motivation

for including the transmitter and receiver of Rutledge on the same chip. As such, a receiver chip having the divergent paths of receiver 300 of Rutledge would not include the inputs of transmitter 200 of Rutledge. Combining Rutledge and Mazurenko does not overcome the inadequacies of Rutledge. As such, the cited references do not, taken individually or in combination, teach, suggest, or motivate a multi-functional integrated optics chip having the specified inputs coupled to a coherent light source.

Claim 7 recites in part: " a loop connected to the multi-functional integrated optics chip at the end of each path." The cited references do not, taken individually or in combination, teach, suggest, or motivate a chip having a loop connected at the end of each of at least two divergent paths. The Office Action asserts that this is taught by Mazurenko's suggesting an increase in key complexity by using additional other coherence modulation arrangements. However, there is not teaching, suggestion, or motivation in either reference to use loops as claimed as a coherence modulation arrangement or for any other reason.

Claim 8 recites in part: "wherein each end is mirrored." The cited references do not, taken individually or in combination, teach, suggest, or motivate a chip having at least two divergent paths with mirrored ends. The Office action asserts that this is suggested by mirror 306 of Rutledge, but that mirror is not a mirrored end of a divergent path within an integrated optics chip. As such, Rutledge does not teach, suggest, or motivate the claimed recitations, and the inadequacy of Rutledge is not overcome by Mazurenko.

Claim 9 recites in part: "the multi-functional integrated optics chip comprises two divergent paths meeting at a convergent end." The Office Action asserts that this is taught by figure 1 of Rutledge and states "divergent beams from beam splitter eventually meeting." However, the beams split by splitter 302 of Rutledge are directed to, and terminate at, sensors/demodulators 304 and 308, and do not "eventually meet". As such, Rutledge does not satisfy the recitations of claim 9, nor is the inadequacy of Rutledge overcome by combining it with Mazurenko.

Claim 11 recites in part: "the multi-functional integrated optics chip further comprises an encrypted message output." As with the inputs recited in claim 5, the cited references do not,

taken individually or in combination, teach, suggest, or motivate a multi-functional integrated optics chip having the specified output.

Claim 12 recites in part: "the message signal input is connected to one path and can reversibly alter the refractive index of the path to which it is connected and the key signal input is connected to one path and can reversibly alter the refractive index of the path to which it is connected." The cited references do not, taken individually or in combination, teach, suggest, or motivate a multi-functional integrated optics chip having both message signal and key signal inputs that can each reversibly alter the refractive index of a path to which it is connected. Moreover, as previously discussed, the use of refractive index dispersion discussed in Mazurenko is a static implementation and there is no teaching, suggestion, or motivation to have an input alter a refractive index let alone both message signal and key signal inputs that can each reversibly alter the refractive index of the path to which it is connected. As such, Mazurenko does not teach, suggest, or motivate the claimed recitations, and the inadequacy of Mazurenko is not overcome by Rutledge.

Claim 13 recites: "An integrated optics encryption device comprising: a multi-functional integrated optics chip, having an input, an output, a message signal input, a key signal input, and two divergent paths with mirrored ends; a signal generating means connected to the message signal input; a signal generating means connected to the key signal input; and a coherent light source connected to the input of the multi-functional integrated optics chip; whereby an encrypted message appears at the output based on the message signal input and key signal input." As previously discussed, the cited references do not, taken individually or in combination, teach, suggest, or motivate an integrated optics chip, nor do they teach, suggest, or motivate a device comprising such a chip. This is particularly true when the optics chip must comprise the specified inputs, outputs, and divergent paths, and must produce an encrypted message in response to signal generator inputs in order to satisfy the recitations of claim 13.

Claim 14 recites in part: "the message signal input is connected to one path and can reversibly alter the refractive index of the path to which it is connected and the key signal input is connected to the other path and can reversibly alter the refractive index of the path to which it is connected." The Office Action asserts Mazurenko satisfies the recitations of claim 14.

However, as previously discussed, Mazurenko does not teach, suggest, or motivate facilitating dynamic modification by application of signals to inputs. Moreover, Mazurenko does not teach suggest or motivate modifying the refractive index of two separate paths. The inadequacies of Mazurenko are not overcome by Rutledge. As such, the cited references do not, individually or in combination, teach, suggest, or motivate all the recitations of claim 14.

Claim 18 recites: "An integrated optics encryption device comprising: a multi-functional integrated optics chip having an input, a message signal input, a key signal input, and an encrypted message output; means for generating a coherent light signal connected to the input of the optics chip; and means for producing "exclusive or" functionality based on the message signal input and the key signal input." As previously discussed, the cited references do not, individually or in combination, teach, suggest, or motivate an integrated optics chip, or any device comprising such a chip. Also as previously discussed, the on/off handling of Rutledge does not provide "exclusive or" functionality, and this inadequacy is not overcome by Mazurenko.

Claim 19 recites in part: "at least one signal generating means connected to the message signal input and at least one signal generating means connected to the key signal input and where the means for producing "exclusive or" functionality based on the message signal input and the key signal input comprises means for dividing the coherent light signal into two divergent paths with mirrored ends and means for altering a refractive index of the paths." Most of the inadequacies of the cited references in regard to obviating claim 19 have already been discussed in regard to claims having similar recitations and need not be repeated. Moreover, the Office Action fails to address the fact that Claim 19 recites that the means for producing "exclusive or" functionality includes means for dividing coherent light into divergent paths. In its attempt to justify the rejection of claim 18, the Office Action points to the encryption and timing circuitry 100 of Rutledge as providing the "exclusive or" functionality, but now points to the splitter 302 and mirror 306 as satisfying the divergent paths with mirrored ends requirement. However, splitter 302 and mirror 306 are not part of the circuitry 100, and as such does not satisfy the recitations of claim 19 in regard to the "exclusive or" means comprising the dividing means.

Claim 20 recites in part: " the message signal input further comprises means for reversibly altering a refractive index of one path and wherein the key signal input further comprises means for reversibly altering a refractive index of another path." The Office Action relies on Mazurenko as satisfying the recitations of Claim 20. However, as previously discussed, the cited references do not teach or suggest using signal inputs to reversibly alter the refractive index of each of two divergent paths. Mazurenko does not teach, suggest, or motivate altering refractive indexes in response to signal inputs and does not teach, suggest, or motivate modifying the refractive index of each of two paths. The inadequacies of Mazurenko are not overcome by Rutledge. Although Rutledge does have divergent paths in its receiver, there is not teaching, suggest, or motivation to dynamically alter the refractive index of the paths.

Claim 22 recites: "A method for encryption using interference from a coherent light source comprising the steps of: issuing a coherent light signal from a coherent light source to a multi-functional integrated optics chip; dividing the coherent light signal into two paths within the multi-functional integrated optics chip; issuing pre-determined signals to the two paths of the multi-functional integrated optic chip where a message signal input is attached to one path of the multi-functional integrated optics chip and a key signal input is attached to the other path; recombining the divided light signal to create an encrypted signal; and, outputting the encrypted signal via an encrypted message output." The Office Action asserts that the "dual modulation" of Rutledge satisfies the recitations of dividing the coherent light signal into two paths, issuing signals to the paths, and recombining the divided light signal. However, it is readily apparent from the text and figures of Rutledge that light carried by fiber 206 is modulated in phase modulator 204 and then carried on fiber 210 and modulated in OOK modulator 208. The light is not split between the modulators, but instead passes through them sequentially. The fact that the beam is not split seems to have been seen but not appreciated in the Office Action as it describes the cited portions of Rutledge as describing dual modulation of a beam rather than modulation of two separate beams. The inadequacy of Rutledge in regard to the recitations of claim 22 are not overcome by Mazurenko. Moreover, since the cited references do not teach, suggest or motivate splitting the light, they also do not teach, suggest, or motivate issuing signals to paths for each portion of the divided signal, and/or recombining the split portions of the light signal. As such,

the cited references, individually or in combination, do not teach, suggest or motivate the recitations of claim 22.

Claim 23 recites in part: "the message signal input and key signal input reversibly alter the refractive index of the path to which each input is connected." As previously discussed, the cited references, individually or in combination, do not teach, suggest, or motivate reversibly altering the refractive index of any path.

The recitations of Claim 26 are sufficiently similar to those of the preceding claims that the inadequacies of the cited references in regard to those recitations need not be discussed further. As with the other claims, the cited references to not, individually or in combination, teach, suggest, or motivate the recitations of Claim 26.

Summary

It is believed that the case is now in condition for allowance, and an early notification of the same is requested. If the Examiner believes that a telephone interview will help further the prosecution of this case, he is respectfully requested to contact the undersigned attorney at the listed telephone number.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on July 8, 2004.

By: James Lee

Signature

Dated: July 8, 2004

Very truly yours,

SNELL & WILMER L.L.P.

Albin H. Gess
Registration No. 25,726
1920 Main Street, Suite 1200
Irvine, California 92614-7230
Telephone: (949) 253-4904